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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,033	03/25/2004	Takatomo Sasaki	10873.1440US01	5813
53148	7590	08/23/2006	EXAMINER	
HAMRE, SCHUMANN, MUELLER & LARSON P.C. P.O. BOX 2902-0902 MINNEAPOLIS, MN 55402			HECKENBERG JR, DONALD H	
			ART UNIT	PAPER NUMBER
			1722	

DATE MAILED: 08/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/809,033

Applicant(s)

SASAKI ET AL.

Examiner

Donald Heckenberg

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-46 and 53-60 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-46 and 53-60 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 August 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office Action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6, 11, 15, 17, 18, 22, 33-46, 53-55, 59 and 60 are rejected under 35 U.S.C. 102(b) as being anticipated by Japanese Pub. No. 2000-233993 (previously made of record in the I.D.S. filed 04 August 2004; hereinafter "JP '993"). Note the English Abstracts and computer translation of JP '993 made of record with this Office Action.

JP '993 discloses a method for manufacturing a semiconductor crystal, specifically a GaN single crystal on a substrate such as quartz glass (Abstract and translation ¶ 19). Alternatively, JP '993 notes that the crystal can be grown on seed crystal nucleus (translation ¶ 24). JP '993 discloses that, using the method, crystal growth of 1500  $\mu\text{m}/\text{h}$  can be obtained (translation ¶ noting 3 mm was grown in 2 hours).

The method includes the step of growing the crystal by crystallizing an aeriform substance comprising a hydride of a Group III nitride of the formula  $\text{GaN}_x\text{H}_y$  (see Abstract). JP '993 notes that the hydride can be obtained from a Ga metal source

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material (translation ¶ 21). The source material in the process is sublimated by heating at 950 to 1150°C (translation ¶ 19).

JP '993 further discloses the process to include the use of ammonia (NH<sub>3</sub>) in the growing atmosphere (Abstract).

3. Claims 56-58 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka et al. (U.S. Pat. No. 6,001,748).

Tanaka discloses a process for preparing a single crystal of nitride. The process includes heating a nitride powder source material to cause the material to evaporate into an aeriform substance (cl. 7, ll. 43-55). Tanaka notes that the heating can be done in the presence of hydrogen (see cl. 8, ll. 56-61). The aeriform substance is then grown into a single Group III nitride crystal (see for example, cl. 9, ll. 22-33).

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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7. Claims 7-10, 12-14, 16, 19-21 and 23-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '993 in view of Hunter (U.S. Pat. No. 6,296,956; previously of record).

JP '993 discloses a method for forming a semiconductor crystal as described above. JP '993 does not note the use of a carrier gas to aid in supplying the aeriform substance to the crystal generation region. JP '993 also does not disclose the inclusion of impurities into the system so that the impurities are introduced in the grown crystal.

Hunter discloses a method for the production of bulk single crystals. In the process, Hunter notes that a carrier gas such as N<sub>2</sub> or argon can be injected into the source material section of the process, thereby providing additional flow of aeriform vapor (cl. 3, ll. 1-5 and cl. 9, ll. 9-15). Hunter further discloses that impurities may be included in the gases so as to have the impurities included in the resulting crystal (cl. 12, ll. 1-15).

It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to have modified the process disclosed by JP '993 as such to additionally supplied a carrier gas to the aeriform substance because this would provide additional flow of aeriform vapor to the crystal growth region as suggested by Hunter. Note, as a result of this configuration.

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of the process, the single crystal would be grown in an atmosphere of a mixed gas containing  $N_2$  (from the carrier gas) and  $NH_3$ , which is injected in the growth region in process of JP '993 (see for example, translation ¶ 5).

It also would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to have modified the method of JP '993 as such to have further introduced impurities into the gases used in the method because this would have allowed for the impurities included in the resulting crystal as suggested by Hunter.

With respect to claim 24, as noted above JP '993 discloses a process wherein the source material is sublimated. Hunter demonstrates, however, that in the single crystal growth methods, the decomposition and evaporation of the source material is a viable alternative process for generation of the material vapor (see for example, cl. 2. ll. 64-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to have modified the process disclosed and suggested by JP '993 as such to have decomposed to liquid and evaporated the source material because this is known in the art as an equivalent process as suggested by Hunter.

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8. Applicant's arguments with respect to claims 1-46 and 53-59 have been considered but are moot in view of the new ground(s) of rejection.

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donald




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Heckenberg whose telephone number is (571) 272-1131. The examiner can normally be reached on Monday through Friday from 9:30 A.M. to 6:00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta, can be reached at (571) 272-1316. The official fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <<<http://pair-direct.uspto.gov>>>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).

 8-21-6  
Donald Heckenberg  
Primary Examiner  
A.U. 1722